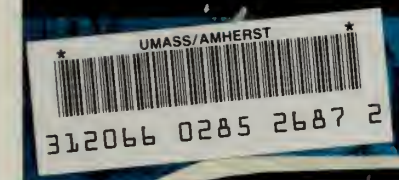
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The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC WORKS

ANNUAL REPORT

July 1, 1978 · June 30, 1979

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ANNUAL REPORT

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

JULY 1, 1978
through
JUNE 30, 1979

Prepared by DPW Staff

WILLIAM C. PIZZANO
Director, Public Information Office

GENE A. DIRADO, Supervisor
Graphic Arts Section

Photographs by
DPW Photography Unit

The Commonwealth of Massachusetts

Executive Office of Transportation and Construction

Department of Public Works

Office of the Commissioner

100 Nashua Street, Boston 02114

November, 1979

His Excellency Governor Edward J. King
Secretary of Transportation and Construction
Barry M. Locke
and the Great and General Court of the
Commonwealth of Massachusetts

Gentlemen:

1979 has been a year of increasing development and accomplishments in improving the business climate in Massachusetts. It is a year in which we have proven the highway program can continue at a high level of activity, totally compatible with environmental and citizen participation requirements.

During the period covered by this report, the department has set a fiscal year record by advertising over $200 million in highway construction and related contracts.

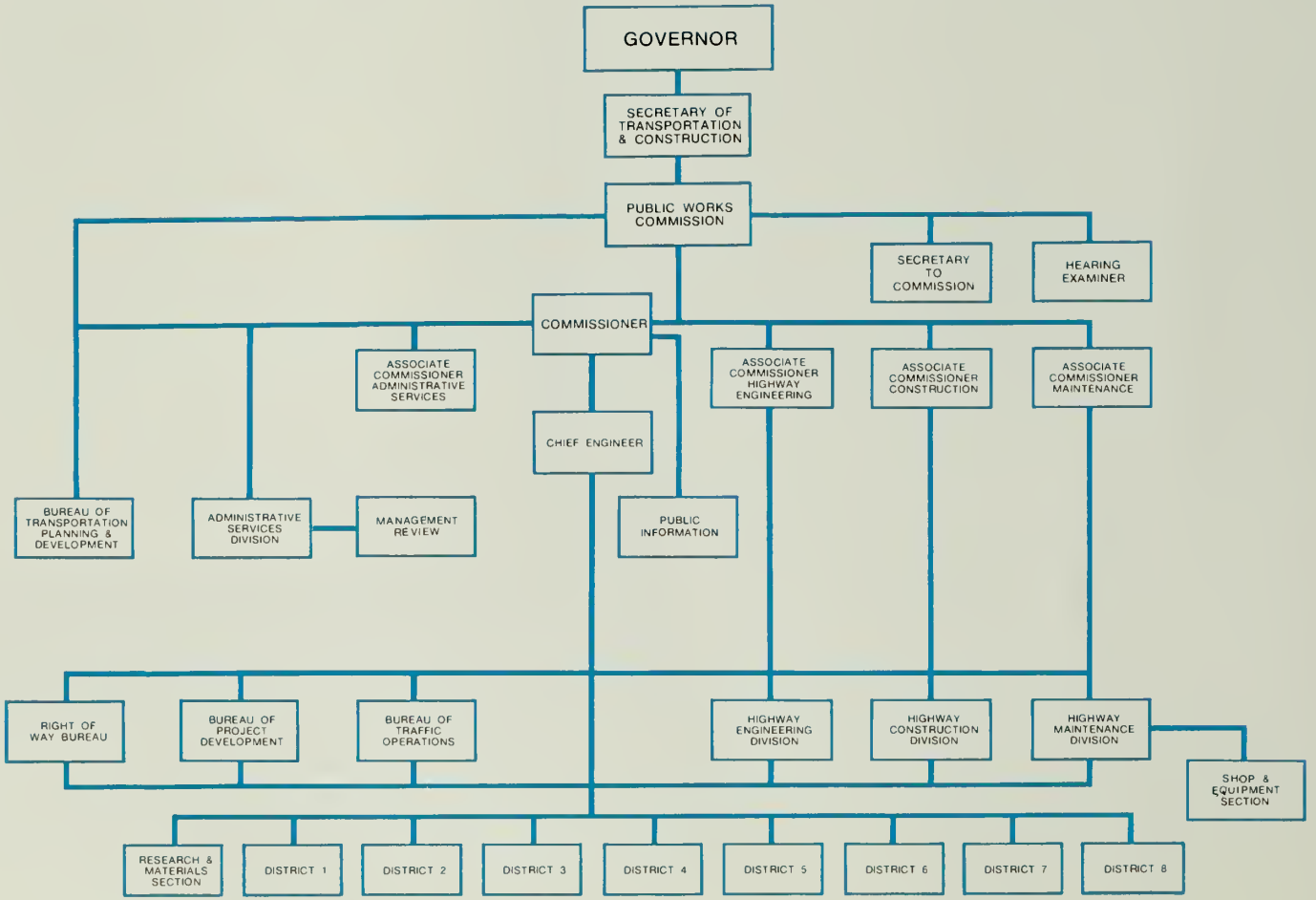
One of my most important goals for the department is the reduction in the total time required in the development of a transportation project from its initial conception to the advertising for construction stage. This desired reduction is starting to be accomplished and will be given our highest priority.

This record breaking performance was made possible by the outstanding efforts and dedication, continually being demonstrated, by the employees of the department.

Very truly yours,

DEAN P. AMIDON
COMMISSIONER

Massachusetts Department of Public Works



MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS COMMISSION

Because of the growing interest of progressive citizens, various clubs and organizations in developing a more comprehensive highway network, the Legislature established a commission to improve the highways of this commonwealth in 1892, called the Massachusetts Highway Commission, a forerunner of the present Massachusetts Department of Public Works.

On January 1, 1921 both the Mass Highway Commission and the Commission on Waterways & Public Lands were abolished by the Legislature and a new Department of Public Works established, which was charged with the responsibilities of both former commissions under a commissioner and four associate commissioners.

After a series of reorganizations of the department, the present Department of Public Works is under the control of a commissioner and four associate commissioners, all of whom hold office by appointment by the governor. Each of the associate commissioners is assigned by the commissioner to oversee in general the particular phase of the department activity conducted in the following sections: Administrative Services, Highway Engineering, Highway Construction and Highway Maintenance.

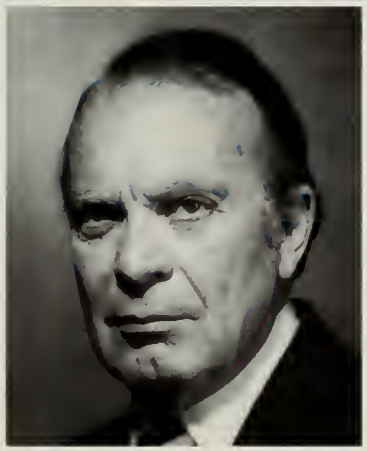
The commission is responsible for ensuring the department maintains its 3000 lineal miles of state highways which breaks down into 11,600 lane miles of roadway. In addition, the DPW is directly responsible for approximately 3000 bridges, of which 600 are railroad bridges turned over to the department in 1971 by the Legislature.



DEAN P. AMIDON, Monterey, career engineer of 29 years with the department. Served as district highway engineer, district 1 since 1969. Named commissioner of the Mass. DPW by Governor King in January, 1979.



PETER E. DONADIO, Dorchester, attorney. Appointed as associate commissioner in 1967. Reappointed by Governor King in January, 1979. Serves as associate commissioner of maintenance.



THOMAS G. BARLOW, Chicopee, former Springfield traffic commissioner. Appointed as associate commissioner in 1972. Reappointed by Governor King in May, 1979. Serves as associate commissioner of administration.

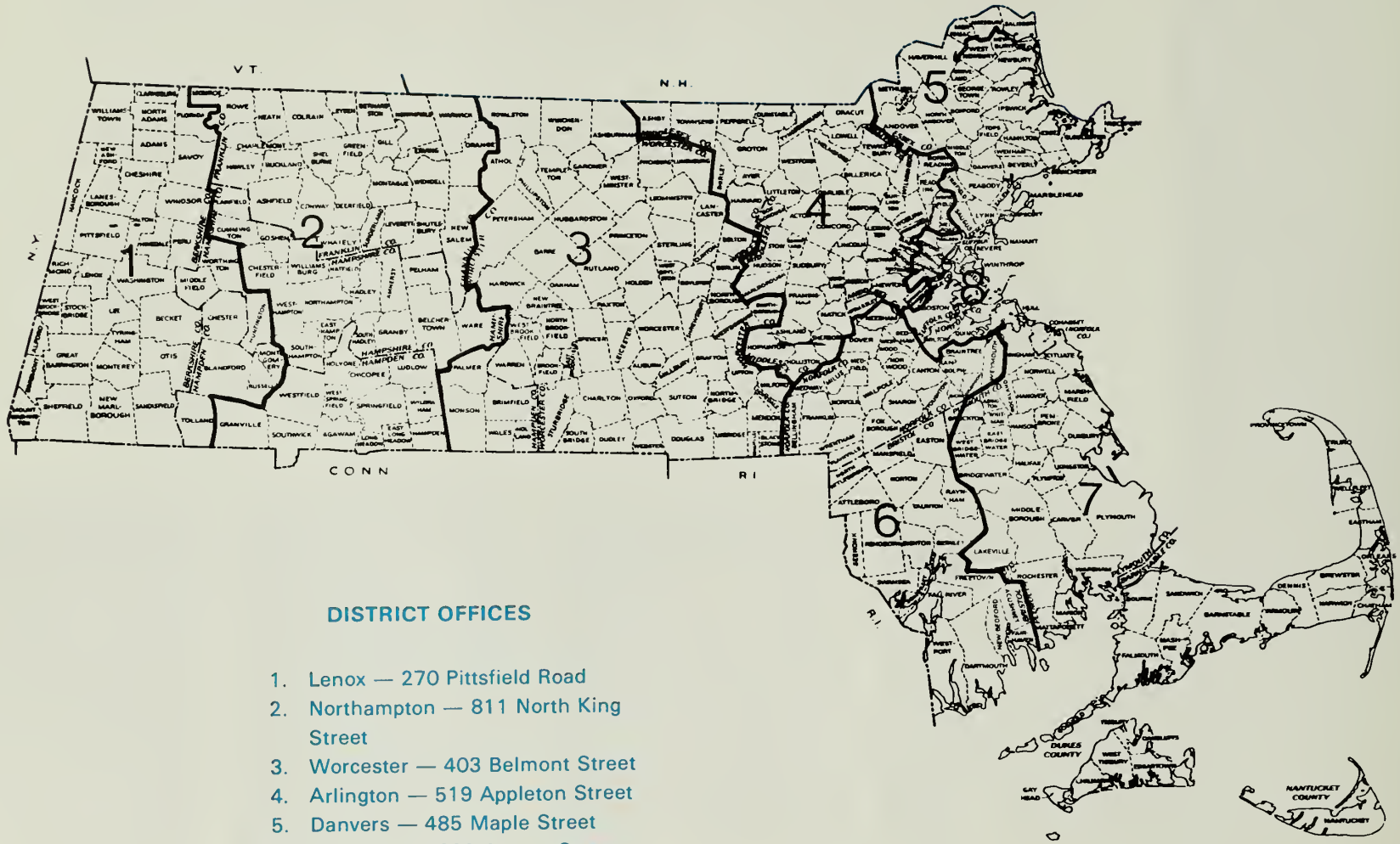


FRANK D. RODICK, Weymouth, attorney. Served as special council to the Weymouth Department of Public Works. Appointed as associate commissioner by Governor King in April, 1979. Serves as associate commissioner of highway engineering.



SANDINO J. TERSIGNI, Leominster, general trucking and public warehousing businessman. Appointed as associate commissioner by Governor King in June, 1979. Serves as associate commissioner of construction.

Mass. D.P.W. District Boundaries



DISTRICT OFFICES

1. Lenox — 270 Pittsfield Road
2. Northampton — 811 North King Street
3. Worcester — 403 Belmont Street
4. Arlington — 519 Appleton Street
5. Danvers — 485 Maple Street
6. Taunton — 1000 County Street
7. Middleborough — 151 Pierce Street
8. South Boston — 400 "D" Street

GAS TAX RECEIPTS

FISCAL YEAR	1978		1979	
	RECEIPTS	CUMULATIVE TOTALS	RECEIPTS	CUMULATIVE TOTALS
JULY	10,195,079		10,256,967	
AUG.	18,280,816	28,475,895	26,267,655	36,524,622
SEPT.	14,415,052	42,890,948	6,221,594	42,746,216
OCT.	20,798,172	63,689,119	31,018,544	73,764,760
NOV.	22,806,737	86,495,856	17,008,037	90,772,797
DEC.	9,658,846	96,154,702	13,706,760	104,479,577
JAN.	31,836,031	127,990,738	20,270,325	124,749,882
FEB.	17,327,685	145,318,423	13,919,200	138,669,082
MARCH	13,968,525	159,286,952	15,922,505	154,591,587
APRIL	6,267,270	165,554,218	30,943,313	185,534,900
MAY	29,649,708	195,203,921	18,741,000	204,275,901
JUNE	21,803,182		19,472,861	
		217,007,111		223,748,762

1979 TRANSPORTATION DEVELOPMENT IMPROVEMENT PROGRAM (IN MILLIONS)

HIGHWAY PORTION	FEDERAL FUNDS (APPROPRIATION)	STATE FUNDS (BONDS)	TOTAL
FEDERAL-AID INTERSTATE CONSTRUCTION	$180.0	$ 20.0	$200.0
FEDERAL-AID CONSTRUCTION OTHER THAN INTERSTATE	116.0	39.0	155.0
ENGINEERING SERVICES	16.0	9.0	25.0
PLANNING AND RESEARCH		4.0	4.0
ADMINISTRATIVE AND ENGINEERING EXPENSES		12.0	12.0
BRIDGES — NON FEDERAL-AID		5.0	5.0
IMPROVEMENTS TO MAINTENANCE SITES		2.0	2.0
HIGHWAY AID TO CITIES & TOWNS		20.0	20.0
HIGHWAY — NON FEDERAL-AID		40.0	40.0
IMPROVEMENTS TO NORTHEAST EXPRESSWAY		12.0	12.0
CHELSEA — REVERE MILL CREEK		1.5	1.5
RESERVE FOR CONTINGENCIES		5.0	5.0
TOTAL HIGHWAY PORTION	$312.0	$169.5	$481.5

THE HIGHWAY FUND

RECEIPTS

Major receipts from highway users as shown on the accompanying pie chart are for fiscal year 1978:

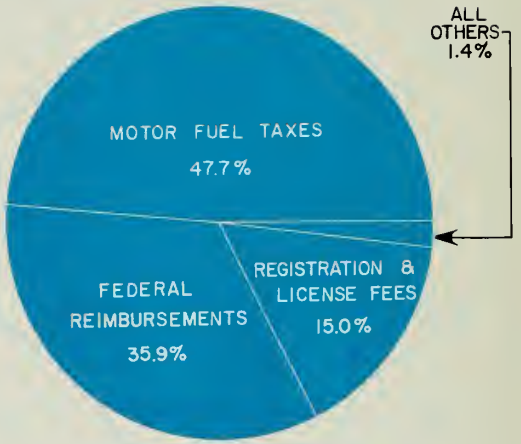
Motor Fuel Taxes (Hwy. Fund)	$188.2 million
Federal Reimbursements (Hwy. Fund)	14.2 million
Federal Reimbursements (Fed. Hwy. Const. Prog. Fund)	127.2 million
Registration & License Fees	59.2 million
Miscellaneous	5.6 million

EXPENDITURES

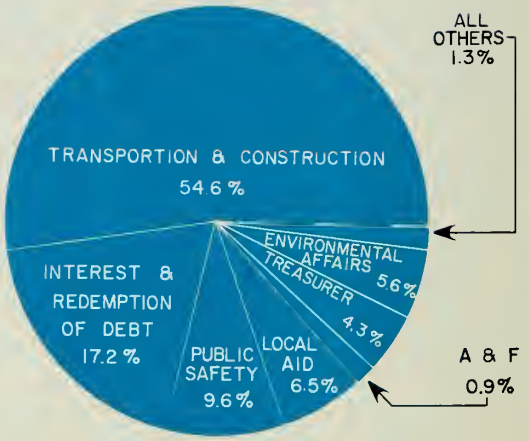
Total Highway Fund expenditures for fiscal year 1978 amounted to $405.0 million. Major expenditures from the highway fund are shown on the accompanying pie chart.

Executive Office of Transp. & Const.	$221.2 million
Interest and Redemption of Debt	69.6 million
Public Safety	38.8 million
Local aid for roadways	26.4 million
Environmental Affairs	22.8 million
Treasurer	17.4 million
A & F	3.5 million
Others	5.3 million

RECEIPTS



EXPENDITURES



Number of Employees in Mass. DPW (1979)

FUNCTIONAL DISTRIBUTION	1975	1976	1977	1978	1979
Policy and Planning	212	202	224	181	160
Construction and Engineering	1620	1435	1458	1352	1442
Maintenance	2327	2179	2094	2132	2150
Administrative Support and Overhead	400	347	362	436	414
TOTAL	4559	4163	4138	4101	4166

GEOGRAPHICAL DISTRIBUTION					
Boston Headquarters	1162	1040	1050	1042	1077
District 1 (Lenox)	227	211	210	219	212
District 2 (Northampton)	354	327	327	323	336
District 3 (Worcester)	439	416	412	386	396
District 4 (Arlington)	453	408	410	409	405
District 5 (Danvers)	394	368	350	354	360
District 6 (Taunton)	633	588	575	581	559
District 7 (Middleborough)	440	391	384	368	387
District 8 (Boston)	255	230	239	232	241
Wellesley (Maintenance and Sign Shop)	135	124	122	127	133
Wellesley (Research and Materials)	67	60	59	60	60
TOTAL	4559	4163	4138	4101	4166

Summary of DPW Highway Construction & Maintenance

CALENDAR YEAR	ACCELERATED HIGHWAY PROGRAM ACTS	$ VALUE OF CONST. PROJECTS ADV.	# LANE MILES STATE HWYS. MAINTAINED
1960	$ 86,000,000	$ 75,000,000	7049
1961	90,000,000	73,000,000	7243
1962	110,000,000	79,000,000	7522
1963	125,000,000	86,000,000	8133
1964		73,000,000	8300
1965	320,000,000	62,000,000	8614
1966		90,000,000	8443
1967	200,000,000	101,000,000	8754
1968		63,000,000	8936
1969	260,000,000	173,000,000	9266
1970		63,000,000	9395
1971		79,000,000	9530
1972	561,000,000	143,000,000	9780
1973		92,000,000	10550
1974		136,000,000	11438
1975	353,000,000	187,000,000	11566
1976		182,000,000	11600
1977	589,900,000	143,000,000	11600
1978		155,882,000	11600
1979		200,000,000 Est.	11660

5 YEAR SUMMARY

(Average/Year)

CONSTRUCTION PROJECTS ADV. ($)		# LANE MILES MAINTAINED
1961-1965	75 million	8,000
1966-1970	100 million	9,000
1971-1975	130 million	10,000
1976-1979	170 million (4 yrs)	11,600

PROJECTS ADVERTISED

JULY	1978	$ 24,775,000
AUGUST	1978	19,548,048
SEPTEMBER	1978	43,521,199
OCTOBER	1978	2,403,177
NOVEMBER	1978	8,303,927
DECEMBER	1978	3,844,544
JANUARY	1979	3,071,116
FEBRUARY	1979	2,278,915
MARCH	1979	42,872,074
APRIL	1979	2,449,682
MAY	1979	6,435,815
JUNE	1979	41,102,499
	TOTAL	$200,605,996

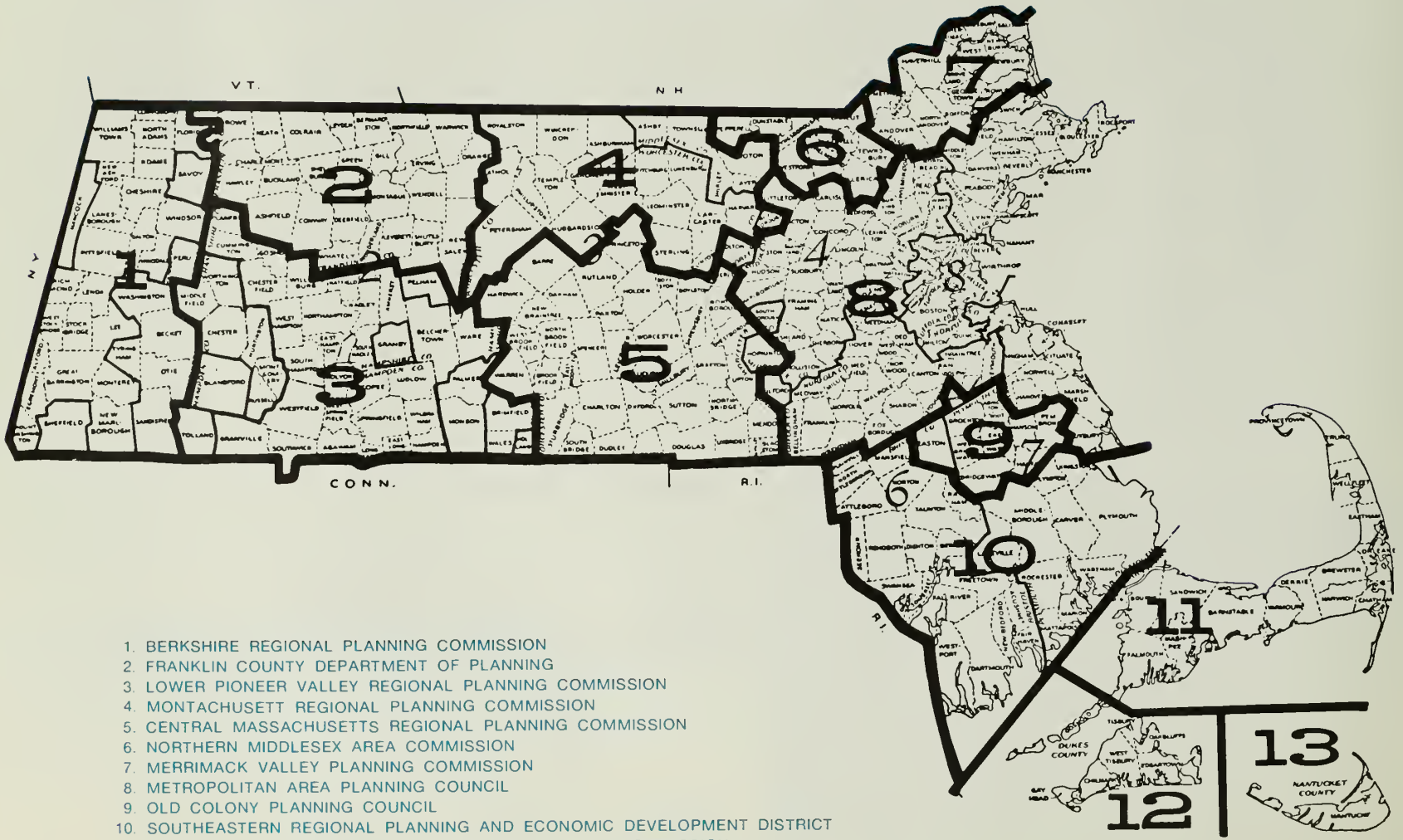
Massachusetts Federal Highway Administration Apportionments

CATEGORY	Fiscal Yr. 1976	Fiscal Yr. 1977	Fiscal Yr. 1978	Fiscal Yr. 1979	Fiscal Yr. 1980
Interstate	99,094,511	1,440,925	37,957,335	69,072,387	105,119,005
Interstate Gap Closing	— — —	— — —	16,623,649	30,072,387	— — —
Interstate Resurfacing	— — —	— — —	2,098,652	2,033,683	2,102,160
Primary Rural	7,702,920	— — —	— — —	— — —	— — —
Consolidated Primary	— — —	20,276,525	20,805,314	22,048,002	22,269,810
Secondary Rural	3,710,370	3,221,459	3,465,127	3,925,383	5,311,976
Urban System	23,760,384	23,944,099	23,944,098	24,005,337	24,005,337
Urban	9,248,193	— — —	— — —	— — —	— — —
Priority Primary	5,952,685	— — —	— — —	— — —	— — —
Hwy. Planning Research (1½%)	2,117,850	744,409	1,597,371	2,304,599	1,604,982
MTA Planning (½%)	922,320	945,715	982,429	1,034,394	1,108,574
High Hazard Locations	1,626,225	— — —	— — —	— — —	— — —
Elim. Rd. & Obstacles	1,626,225	— — —	— — —	— — —	— — —
High Hazard-Rd. side Obstacles	— — —	2,723,279	2,721,033	— — —	— — —
Rail-Hwy. Crossings (on sys)	1,294,977	2,458,456	2,497,303	2,359,224	— — —
Rail-Hwy Crossings (off-sys)	— — —	1,475,074	1,498,382	— — —	— — —
Safer Rds. Demo.	2,102,907	— — —	— — —	— — —	— — —
Off System Rds.	1,349,555	— — —	— — —	— — —	— — —
Safer- Off Sys. Rds.	— — —	3,323,025	3,258,226	3,274,588	— — —
TOTAL	**$160,509,122**	**$60,552,966**	**$117,448,919**	**$160,308,007**	**$161,522,844**

ALLOCATIONS					
Pavement Markings	380,325	764,537	787,722	1,018,729	— — —
Spcl.Br. Repl.	1,765,185	5,946,768	1,704,641	13,456,219	— — —
Econ. Growth ctr. dev'l	831,940	436,393	— — —	— — —	— — —
Hwy. thru 1974					

Bureau of Transportation Planning & Development

REGIONAL PLANNING AGENCIES



1. BERKSHIRE REGIONAL PLANNING COMMISSION
2. FRANKLIN COUNTY DEPARTMENT OF PLANNING
3. LOWER PIONEER VALLEY REGIONAL PLANNING COMMISSION
4. MONTACHUSETT REGIONAL PLANNING COMMISSION
5. CENTRAL MASSACHUSETTS REGIONAL PLANNING COMMISSION
6. NORTHERN MIDDLESEX AREA COMMISSION
7. MERRIMACK VALLEY PLANNING COMMISSION
8. METROPOLITAN AREA PLANNING COUNCIL
9. OLD COLONY PLANNING COUNCIL
10. SOUTHEASTERN REGIONAL PLANNING AND ECONOMIC DEVELOPMENT DISTRICT
11. CAPE COD PLANNING AND ECONOMIC DEVELOPMENT COMMISSION
12. DUKES COUNTY PLANNING AND ECONOMIC DEVELOPMENT COMMISSION
13. NANTUCKET COUNTY REGIONAL PLANNING COMMISSION

PLANNING/ADMINISTRATION

HIGHWAY DATA COLLECTION AND PLANNING SERVICES

- Inventory and Statistics
- Traffic Volume Counting
- Highway Functional Classification
- Highway Needs Identification
- Mapping
- Defense Bridge & Critical Highway Facilities Record

DATA ANALYSIS AND COMPUTER SERVICES

- Census Data Development
- Data File Management and Display
- Traffic Analysis and Forecasting
- Motor Vehicle and Fiscal Data Reporting
- Regional Data and Modelling Assistance
- Statewide Modelling and Planning Applications
- Eastern Massachusetts Area Transportation Studies

REGIONAL TRANSPORTATION PLANNING

PROGRAM DEVELOPMENT

CAPITAL EXPENDITURE AND PROJECT PROGRAMMING



The Bureau of Transportation Planning & Development was established in 1964 under the provisions of Section 3A of Chapter 16 of the General Laws.

The bureau by statute, serves as the principal source of transportation planning in the commonwealth and is responsible for the continual preparation of comprehensive and coordinated transportation plans and programs. In addition, the bureau maintains a data bank of all available transportation related statistics for reference by all public agencies in the commonwealth.

Since its formation in 1964, as part of the state's response to the requirement of the 1962 Federal-Aid Highway Act that called for the establishment of a comprehensive, cooperative and continuing transportation planning process (3C process) in urbanized areas, the bureau has fulfilled its mandate regarding the urbanized areas while extending the process to rural areas as well.

The continuing implementation of the 3C process is focused upon the regional planning agency jurisdictions that encompass all 351 communities in the commonwealth. Major work efforts were directed toward carrying out those transportation planning activities necessary to obtain federal certification of the existence of an adequate transportation planning process. Without endorsed certification documents such as unified work programs, transportation plans and transportation improvement programs, the flow of federal funds for capital transportation improvement projects is interrupted.

Federal law requires that each state highway agency produce an "Action Plan" as further documentation that the 3C process is, in fact, actively adhered to and reflects citizen participation in both policy and project decisions. The bureau has coordinated the efforts of a special task force that completed a major revision of this Massachusetts "Action Plan". The revision presents a general over-

Continued on page 12

BUREAU OF TRANSPORTATION PLANNING & DEVELOPMENT (cont.)

view of the department's organization and methods of operation in a less detailed manner than the original document, but better organized for reading and understanding by the lay person.

Apart from coordinating multi-modal transportation planning activities at all levels of government, the bureau carries on important day-to-day functions in the conduct of special planning studies, data collection and management, technical analyses of existing conditions leading to forecasting, mapping, etc.

In the past year, the bureau completed a detailed study of the entire financial structure of the Massachusetts Highway Fund. A six volume analysis of the study findings entitled "Forecast of Highway Program Needs and Revenues, 1979-1980", has been published. It is expected to serve as the basis for legislative recommendations regarding funding mechanisms to be employed to service transportation needs and related services for the next decade.



Typical deluxe van seating up to 15 people that is available to commuter groups of 12 to 15 people under the BTP & D's Caravan for Masspool, Inc. Program

A procedure has been established with active participation and involvement by each MDPW district office and all 351 communities in the state for the continual updating of road Inventory data. Among the most comprehensive of state maintained road inventories in the country, the bureau data bank contains detailed information on over 33,000 miles of road open to public travel in the state. One of the many important applications to which the road mileage data is put is the funding determination of federal and state aid to local communities.

Another major data collection responsibility of the bureau is concerned with traffic volume counting. Coordinated by specialists at BTP&D headquarters, the actual counting is done under the direction of the field staff located at the department's Maintenance Depot, in Wellesley, and in cooperation with the district highway offices. At present there are three types of counting stations being employed: permanent or continuous-count stations, (26 in number), control stations, (112), and coverage stations (850). In addition, several hundred counts were taken for special purposes. All of the permanent stations have been converted to loop operation and the bureau is making arrangements to convert the remaining 50% of these control stations not yet completed. The results of this counting program are shown in an annual bureau publication: "Massachusetts Traffic Volumes." The most current edition, for 1978, serves as a reference for public and private transportation planners and the business community and is on sale to the general public.

A prime function of the bureau is the translation of the collected volume counts into

refined travel demand estimates. Future travel demand estimates are provided in reply to request of the Highway Design, Bridge & Traffic Operations Divisions of the department as well as those requested by RPA's, other state and federal agencies and consultant engineering firms.

Highway travel statistics compiled from bureau files are used by varied groups and agencies to make important estimates in areas such as air quality and energy conservation planning activities. In addition, the statistics on vehicle miles of travel provide the basis for the determination of the amount of federal aid highway safety funds that are received by the state.

A special unit of the bureau is charged with maintaining the functional classification of every road and street in the state. This functional classification was established in cooperation with local officials and serves as the basis for the determination of how each road and street fits into the federal aid system of the highways and its eligibility for funding. Requests for changes in classification, received from officials of local communities, are processed by this unit.

The mapping section recorded sales of approximately $3000 in its "at cost" program of general public sales. The work of updating the mylar base maps is nearly 30% completed.

The bureau has demonstrated its flexibility in adapting to changing interests and demands many times in assuming leading roles in bikeway planning, railroad studies, highway needs studies, planning for air quality, and the conduct of corridor planning studies.

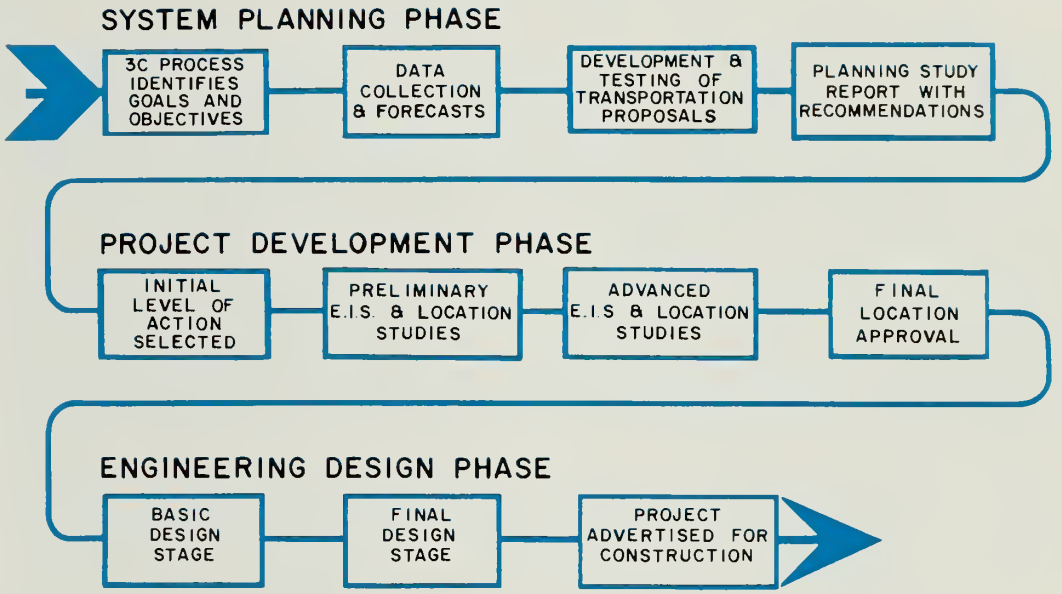
Few tasks have tested the bureau's adaptability as has the Masspool Ridesharing Program. Although almost totally an operational program, the bureau was assigned the Masspool Program on August 7, 1977. The program has been carried throughout the Boston Air Quality Control Region (AQCR) for any establishment having 250 or more employees. By the end of 1978 this program was made available to over 360,000 emloyees. Additionally, the Pioneer Valley AQCR was organized, thereby bringing the Masspool Program to Hampden, Hampshire and Franklin counties.

A commuter pass based program was instituted with the formation of a third party, non-profit corporation known as Masspool, Inc. It was established as an Official Industrial Park Program to lease vans and operate vanpools.

Masspool is considered one of the top three programs in the nation, in terms of success and cost effectiveness. The program is now being considered for expansion to meet the demand for its services in the areas of the state.

In the coming year, the BTP&D's major role will be to continue a policy oriented planning process streamlined to respond to changes in goals, values and new technologies, while concentrating on the development of short range plans which lead to public investments that stimulate economic growth.

STEPS IN THE DEVELOPMENT OF A TRANSPORTATION PROJECT IN MASSACHUSETTS



Bureau of Project Development

LOCATION AND SURVEY
- Location Section
- Geodetic Section
- Photogrammetric Section

ENVIRONMENTAL SECTION

SPECIAL PROJECTS

The Bureau of Project Development is responsible for transportation projects and related activities after the Bureau of Transportation Planning & Development has assigned priorities to them under its system planning phase. The bureau's work continues the "3C" planning process, a continuing, cooperative and comprehensive effort, using full citizen participation to develop projects from preliminary engineering through basic design, complying with applicable federal and state environmental laws.

The bureau is responsible for the study of transportation alternatives within a corridor location. It develops the various alternatives within the corridor using the "no-build" option as a basis for comparison.

The bureau prepares preliminary plans and profiles with cost estimates, and develops the socio-economic and environmental impacts for each alternative. The study produces a recommended alternative and a draft environmental impact statement. After a public hearing, if the project does not have major opposition, a basic design report is completed with a final environmental impact statement. The project, if approved by federal and state officials, then can proceed into the final design phase.

The Location Section produced 16 location projects to various stages of completion and supervised the progress of 10 consultants under contract to prepare project development plans and composite reports. During this process the location consultant coordinator prepares all the arrangements for corridor and design public hearings. Upon completion of these contracts, subject projects are developed in sufficient detail to progress into final design.

This section prepares plans for presentation at the aforementioned hearings as well as assists other sections with said hearings. Corridor planning studies are reviewed and comments are forwarded to the Bureau of Transportation Planning & Development. In addition, multi-modal transportation projects are developed and interfaced between highways and public transit and parkway facilities. This section is also represented at various regional planning agency meetings whenever possible.

The Geodetic Survey Section continued to establish and maintain, horizontal and vertical control with the commonwealth. The Geodetic Section provided services to municipalities, private surveyors and consultants with control data throughout the year. A continuous record of lost and recovered horizontal and vertical stations is kept on file.

During the past fiscal year the Geodetic Section was involved in establishing a control survey network for the Southern Middlesex Registry of Deeds under a Land Title Demonstration Project.

This section also assisted the National Geodetic Survey in locating and establishing calibrated baselines for use by state and private surveyors for field checking of electronic distance measuring equipment at five locations throughout the state.

During the past fiscal year the Photogrammetric Section awarded approximately $223,000 for aerial mapping on seven projects for environmental studies and design plans at various scales. Also during the past year the department instituted competitive bidding for photogrammetric contracts. In addition, four projects were flown under a blanket contract for aerial photography.

Also the Photogrammetric Section renewed the annual 50-50 Cooperative Topographic Mapping Agreement with the U.S. Geological Survey for $250,000 for updating and revising the 7½ minute quadrangle maps to a scale of 1:25,000. As of the end of fiscal 1979 approximately 60% of the topo maps have been photographically reduced to the new scale.

The Photogrammetric Section hosted a ten day workshop course on "Aerial Surveys for Highway Engineers" which was conducted by personnel from the Federal Highway Administration, and attended by several sections of the department.

In fiscal year 1979 the Environmental Section participated in and was responsible for a number of studies concerning archaeology. These studies ranged from preliminary investigations to data recovery on two interstate construction projects, I-495 and I-391.

The Environmental Section also supervised the development and distribution of two draft and one final negative declaration, as well as four draft and two final environmental

impact statements.

In addition, the staff processed 100 environmental notification forms in response to the Massachusetts Environmental Policy Act.

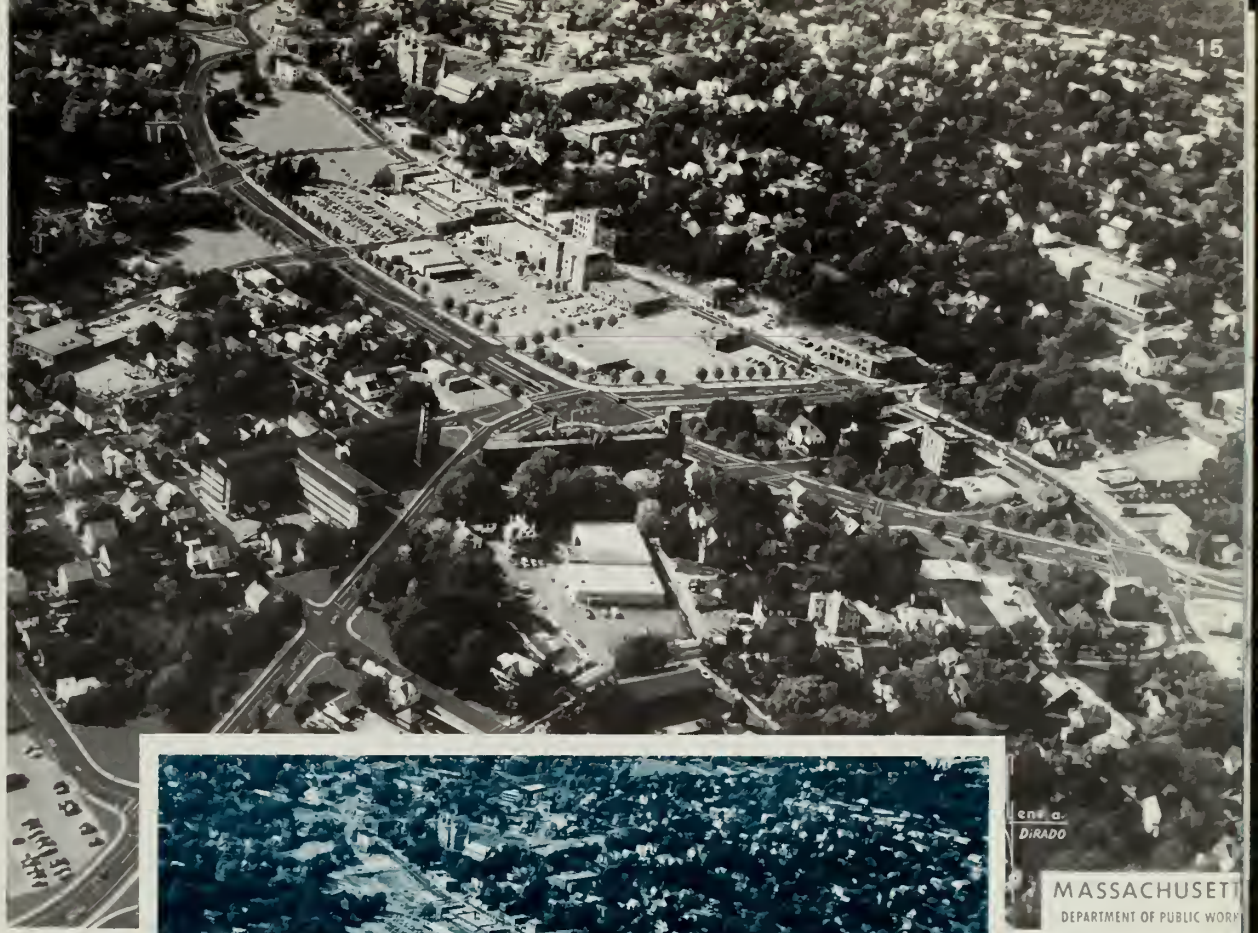
The Special Projects Section closed out two contracts which have been on the books for several years. These involved the settlement of costs and product associated with the Boston Transportation Planning Review begun in 1970, and the Chelsea Transportation Study begun in 1973.

Work on three contracts for implementing the Peabody-Salem Connector are close to the point of transfer to highway design. Two EIS engineering reports, the Revere Beach Connector and the Route 1 North Upgrade (Revere to Lynnfield) are approaching final EIS status.

The Northern Avenue Bridge Project has been substantially ready to design for the past three years; delay is resulting from a multitude of design modification requests developed since the public hearing under the participating process.

The economic development studies by this section have aided in the start of construction by the private sector for the Assembly Square Commercial - Office Complex in Somerville, and progress at the Wellington Station Development concept has been reviewed.

This section is also coordinating the interagency technical data in the Southwest Corridor with the "T" and at Park Plaza with EOTC and the city of Boston.



Existing location and artist conception of proposed relocation of US Route 20 and State Route 85 to improve traffic circulation in downtown Marlborough.

Highway Engineering Section

HIGHWAY ENGINEERING DIVISION

- Highway Design
- Consultant Contract Engineer
- Plans Section
- Roadside Development
- Urban Systems Section
- Urban Design
- Specifications
- Plans & Records
- Layouts
- Hydraulics
- Utilities
- Bridge Section
- State Aid



Martha's Vineyard Bikepath

During the past few years the Massachusetts Department of Public Works made a noteworthy transition from the emphasis almost entirely on highway construction to a truly multi-modal transportation agency. This is best reflected by the awarding of contracts for railroad rehabilitation, bikepaths, MBTA related projects, carpool lanes and the purchase of a South Shore commuter boat. This reflects the versatility of the Highway Design Section which is responsible for the engineering and administration required to produce construction plans necessary for advertising these projects.

Highway design is no longer merely an economical analysis among safe alternate design concepts. Although economic considerations are important and safety remains paramount, environmental concerns, community impact and aesthetics all play an increasingly important part in the selection process.

Major expressways on new locations still form a part of the engineering effort, particularly geared toward completion of the interstate system. Design emphasis is increasingly placed on reconstruction and upgrading of existing facilities pavement and bridge rebuilding, removal or protection of hazardous objects, the installation of the latest in safety equipment and appurtenances.

Built into our design are a variety of measures to minimize adverse environmental impacts. Among these are flatter grades to decrease the need for winter salting, drainage systems which carry road water runoff beyond water supplies, ponds and other sites where even the slightest chloride contamination would be harmful, sedimentation basins to prevent silting of streams, noise barriers to decrease the impact of traffic on schools and residences.

Again this year, a major product of highway engineering are safety projects. These include: bridge replacements, safety screening, impact attenuation devices, the removal and/or protection against fixed hazardous objects. Safety and bridge replacement will undoubtedly be the largest components of the design program once the interstate system is complete.

The department is the owner of approximately 2700 bridges in the commonwealth. They vary in size, type, age and condition, from a stone arch built more than 200 years ago in Ipswich to a mile long structure spanning the Taunton River in Fall River, Mass.



Joint Mass. DPW-BRA Fanueil Hall/Dock Square National Prize Winning Project in Boston.

In addition to the DPW owned bridges, there are 4000 bridges under the ownership of cities and towns.

For the first time the U.S. Surface Transportation Assistance Act of 1978 made off-system bridges eligible; at least 15% and up to 35% of a state's bridge funds must be spent for off-system projects. The act provides $900 million a year for fiscal year 1979 building up to $1.3 billion in fiscal year 1981.

State aid for communities is another major responsibility. A $13,538,720 distribution authorized by Chapter 356, Acts of 1977, provided the 351 municipalities in the commonwealth with funds for constructing town and county ways. Under this appropriation the communities received the same allocation as fiscal year 1978.

In addition, disbursements totalling $25,405,000 were made to the municipalities under Chapter 497, Acts of 1971, as amended by Chapter 492, Acts of 1974. These acts provide that one cent of the state tax on gasoline be made available to cities/towns for highway purposes; namely, to construct, maintain and police public ways.

The legislature, under Chapter 367, Acts of 1978 (the budget), also made $20,969,803 available for highway transit development purposes.



Mansfield Information Center, I-95

Right of Way Bureau

The function of the Right of Way Bureau is to acquire the land and rights in land required to construct, maintain and improve the interstate and state highway systems in Massachusetts. In order to meet its obligations, the Right of Way Bureau must undertake a wide and diversified range of legal and administrative activities; it has developed professional expertise in a wide range of fields. These include real property law, eminent domain law, appraising, conveyancing, negotiating, property management, relocation of households and businesses, highway beautification, building codes, zoning and the processing of documents required by state and federal regulations.



Functional replacement underway of the YMCA in Worcester for the I-190 project.

During fiscal year 1979, the Right of Way Bureau acquired 1,645 parcels of land from 818 property owners. The acquisition awards paid for these properties totaled $10,852,755. During this period, the major activities of this bureau involved the acquisition of the properties required for the completion of Interstate Route 391 in Chicopee; Interstate Route 190 in Leominster, Lancaster, Sterling, West Boylston and Holden; and Interstate Route 495 in Taunton, Bridgewater, Raynham, Norton and Mansfield. All properties required for the construction of these projects have been acquired and construction has either started or will begin shortly.

Listed below are a few highlights of the activities of the Right of Way Bureau indicating the nature of the bureau work. Relocation planning, for example, has participated in the preparation of all environmental impact statements and has focused on the human and social aspects which must be considered when property owners are expected to vacate their properties under eminent domain procedure. More than 50 projects were actively worked on and conceptual stage relocation plans were prepared for five projects.

The Project Section, which interviews property owners and obtains all data and plans required for appraisal of cases, worked in over 100 cities and towns securing information for 1190 cases.

The Conveyancing Section was responsible for the completion of 596 full title examinations and 268 rundown title examinations. Deeds for 52 railroad bridges under Chapter 634 of the Acts of 1971 were approved and recorded. In addition, deeds for the transfer of 138 parcels of excess land were prepared and three easements and eight leases were also prepared.

The staff appraisers assigned to the Appraisal Section of the Right of Way Bureau prepared 511 appraisals and fee appraisers working under contract for the bureau completed another 321 appraisals. All of the appraisal reports were reviewed by the Appraisal Review Section.

In order to clear the acquired rights of way for construction, it was necessary to relocate 115 families from their homes and 43 businesses. This was accomplished with the least amount of inconvenience to the persons and

businesses involved by the Relocation Section of this bureau. The cost of relocation benefits which were paid to claimants totaled $1,865,945.00.

The Property Management Section of the bureau received the following income during this period: from rentals, $498,155; from leases, $169, 417; and from sales of excess land, $214,684. Total income was $882,256 while expenses for managing properties was $220,312 leaving a net income to the commonwealth of $661,944.

Two properties which had been taken for highway purposes were functionally replaced during this period. These were the F. J. McGrath School and the Greendale YMCA. Both of these structures are located in the city of Worcester. The cost of these two projects was in excess of $7,000,000. Planning was started for functional replacement of the Church of the Nativity in Chicopee, the Worcester Registry of Motor Vehicles Building, a municipal swimming pool in Holyoke and a storage building for the University of Massachusetts located in Wareham.

Finally, the Sign Control Section was involved in the removal of 1,762 illegal non-compensable signs that were located within the state highway layout. During fiscal year 1979, this section caused the removal of 15 legal non-conforming signs for which compensation was made.



Functional replacement of the Church of the Nativity, Chicopee with new I-391 bridge across Connecticut River shown in background.

Central Artery Project

The past year completes the third year of the existence of the Central Artery Section, a unit that has been charged with the responsibility for the planning, environmental studies and design of major improvements to the Central Artery in Boston.

The project has been separated into three geographical areas: the North, located between the Prison Point Bridge and the Charles River; the Central, from the Charles River to the Dewey Square Tunnel; and the South, from the Dewey Square Tunnel to the Massachusetts Avenue Interchange.

Using consultants to assist department staff, the chief accomplishments during the year were completion of: (1) One of the most extensive origin and destination studies undertaken by the department. For example, over 675,000 license plate observations were made to provide basic data for the survey. The study has provided a complete, accurate and up-to-date record of motorists' travel behavior that is necessary for further planning and design of the artery. (2) A comprehensive utilities study within the Central Artery Corridor. Over 5,000 plans of existing utilities were gathered and 23 different utilities were identified. From this, 617 plans were prepared. Because of the vast amounts of information available, a computerized retrieval system was developed. (3) Construction of a 40-scale model of the proposed Charlestown (North Area) Project. The model, which is highly realistic in detail and encompasses 450 acres, has been a useful technique in explaining a complex project to the public.

The final environmental impact statement for the North Area has been approved by the Federal Highway Administration and negotiations have been completed with a consultant firm to proceed with design of the project. Design is anticipated to be underway by January 1980.

The Central Transportation Planning Staff (CTPS) has been under contract to the department to provide support for the project. Together with the CTPS, Central Artery staff has undertaken an intensive participatory process to advise the public of agency actions



Governor Edward J. King (extreme right) reviewing Northern Area Model of Boston's Central Artery Project.



Frank Sholock, Director, Central Artery Projects, shown explaining proposed Third Harbor Crossing project presently under study by the DPW.

and to include public concerns in the planning and design process. Both agencies are in the initial stages of developing a corridor planning study for the Central and South sections of the artery that will also include a Third Harbor Crossing. Advice and assistance on the Third Harbor is being provided by the Massachusetts Turnpike Authority. The corridor planning study will identify various alternatives for the artery and a Third Harbor Crossing and these will, in turn, be thoroughly investigated during environmental impact studies.



Looking west along Boston's Central Artery being studied for reconstruction.

Highway Construction Division

Construction Section
Contract Engineering
Final Review Section

During the 1979 fiscal year, the Construction Division of Public Works assumed the responsibility for engineering supervision and staff advice of approximately $170,000,000 of new construction projects. This is in addition to projects which were advertised in previous fiscal years and were still active during the fiscal year from July 1, 1978 through June 30, 1979.

The above figure includes projects carrying in size from $4,400 for a demolition project to almost $35,000,000 for a section of I-391 in Chicopee, which is the largest single contract ever awarded by the Department of Public Works.

In addition to the construction and reconstruction of interstate, primary and secondary route projects, other work included safety improvement projects (formerly TOPICS), high hazard elimination projects, grade crossing improvements, guard rail and signing upgrading, bridge replacement and reconstruction and special projects such as the Freedom Mall in Boston.

Also included in the yearly total were contracts totalling $1,316,000 for emergency repairs to facilities in various coastal communities for damages caused by the February 1978 storm.

Due to the president's anti-inflation policies, the department must now analyze any low bid which exceeds the preliminary estimate by more than seven percent. Justification for award of such contracts must be forwarded to the Federal Highway Administration prior to approval for federally funded projects.

The department continued its policy of encouraging minority contractors to bid on state projects by setting aside certain percentages of the total bid price on major contracts to be sublet to minority contractors as a condition for award of the contract.

In addition, on all projects, contractors are required to employ a certain number of minorities or women in the various trades, depending on the size of the project.

The department also continues to stress strict adherence to state and federal environmental and anti-pollution regulations.



Portion of viaduct section under construction for I-190, Worcester.

Projects Awarded for Fiscal Year Ending June 30, 1979

NUMBER	CATEGORY	AMOUNT
83	Federal Aid	$168,329,522 29
10	State Highway Construction	822,849 65
12	Chapter 90 — State Aid	3,547,797 25
247	Maintenance	8,360,810 12
352	TOTAL	$181,060,979.31



Artist conception of completed Route 9, Speen Street. Project presently under construction in Natick.



Aerial view of Wellington Bridge reconstruction over the Mystic River on Route 28 in Medford.

Highway Maintenance Division



Mass DPW underwater bridge inspection team placing sandbags at the Galen St. Bridge in Watertown to prevent further erosion.

Maintenance consists of routine physical maintenance work and betterment work. Physical maintenance consists of maintaining the highway and its existing facilities or restoring it to its originally constructed condition.

During fiscal year 1979, the Maintenance Section completed 250 contracts for various types of work such as roadside maintenance, snow and ice control, traffic maintenance, structures and highways.

During the five year period 1975-1979, a total of 531 miles out of 1,000 miles were resurfaced. The resurfacing program over the period of time was operating with a 47% deficiency.

Through the use of federal funds, damaged guard rail on approximately 181 miles of state highway was repaired and/or upgraded. These funds consisted of $1,700,000.00 from various federal aid programs.

In the area of conservation and the use of energy in highway maintenance work, the department is planning several projects in the near future that will utilize bottom ash residue as an aggregate in bituminous concrete pavements and extended sulphur as a partial substitute for liquid asphalt in bituminous concrete pavements. These recycling projects will be studied for effectiveness.

An experimental night paving project was conducted on Route 128 for the purpose of reducing traffic congestion. The results were favorable.

The traffic maintenance activities during fiscal year 1979 included the issuance of 33 contracts in the areas of pavement markings, safety devices, signals, call boxes and sign maintenance at a total cost of $1,559,-350.00. Eighty-one percent of this work involved 90% federal participation.

New installations during the year included 10,000 raised pavement markers on Interstate Routes 93, 495, 95 and 290. These markers reflect during adverse weather when the standard traffic lines do not. Another new device being used is a more vandal resistant traffic signal light. This light uses glass fibers to transmit the light energy.

Materials for traffic maintenance were purchased in the pavement markings, safety device, electrical and sign areas. The cost of these materials totaled $948,160.00 of which 28% of the total involved 90% federal assistance.

Total activities in traffic maintenance consisted of $1,535,740.00 involving federal aid work and $971,770.00 in non-federal aid work.

Activities carried on by contract under the Roadside Maintenance Unit during fiscal year 1979 consisted of the following work: mist blower spraying, poison ivy spraying, drainage ditch spraying, providing portable roadside sanitary facilities, travel trash collection, grass mowing and soil sterilant spraying.

Normal force account roadside maintenance activities, such as vista clearing, selective clearing and trimming, brush control for safe sight distance, emergency tree removal and trimming, litter pickup, rest area and truck turnout improvement, drainage ditch clearance and spraying, soil sterilant spraying, mist blower and grass mowing were carried on in all districts.

As of July 1, 1979, the Structures Maintenance Unit had responsibility for inspection of 3400 bridges, maintenance of 2750 bridges and record keeping for 4000 bridges.

The maintenance work load area is now approximately 2,700,000 square yards of bridge deck, plus superstructure and substructure elements.

During fiscal year 1979 the following work was accomplished:

1700± Bridge Inspections
7 Bridge Betterment Projects ($1,820,000)
4 RR Bridge Repair Projects ($ 700,000)
2 Bridge Repair Projects ($ 120,000)
35 Bridges Painted ($ 378,000)

The department's diving team, responsible for underwater bridge inspection, was awarded a certificate for excellence by Region One FHWA.

The Equipment Unit was active in the area of purchasing 574 pieces of equipment ranging from diesel snow fighters to marine radios at a cost of $5,338,865.21.

The Permit Unit issued 25,110 permits for the movement of heavy equipment, house trailers, buildings and other irreducible loads. Approximately 228 permits were issued for driveways and utilities.

In fiscal year 1979 the Personnel Unit of the Maintenance Division processed twenty-four promotional bulletins and nine civil service certifications for approximately 460 positions.

The implementation of the Massachusetts Maintenance Management System was completed during fiscal year 1979.

The Maintenance Management Unit, while keeping the system operating, is involved primarily with revising, adjusting and fine-tuning the various system elements.

In the area of maintenance training a supervisory review program for foremen was conducted at each district during the fall of 1978.

Department personnel attended one, two and three day automotive courses at the G.M. Training Center and diesel distributors.

A welding course is being developed for Districts 1, 2, & 3.



DPW heavy 'V' type plow in action pushing back snow banks.



Typical salt storage shed used by Mass. DPW and being made available to certain cities and towns for their salt storage.

The Communication Unit realized advancements during fiscal year 1979. A new console was procured which eventually will insure the monitor control station at Nashua Street with statewide, 4 frequency, car to base and car to car capability. When operated in conjunction with the new 2 gigahertz microwave links to Mt. Wachusett and Mt. Lincoln, the system gives better statewide and district coverage.

During the 1979 fiscal year, the department plowed and treated 11,800 lane miles of state highways. Contracts were let for the furnishing and delivering of sand, sodium chloride and pre-mixed sodium and calcium chloride to various department locations. To combat a relatively mild winter, which included 18 snowstorms and 7 sleet storms, 152,500 tons of chemicals were applied.

The Safety Unit is now a part of the Maintenance Division. It is continually striving to update and carry out the Safety Program in the department.

The unit was instrumental in coordinating and establishing cardiopulmonary resuscitation courses throughout the department. Over four hundred employees have been certified as Basic Life Support Rescuers.

Bureau of Traffic Operations

The Bureau of Traffic Operations is engaged in transportation engineering with the objective of providing improved traffic management and efficiency, increased traffic safety, and providing safety improvements for pedestrians. The bureau works closely with other divisions within the department as well as with state, municipal and federal agencies to provide improved traffic operations and services to meet the needs of the commonwealth. In addition, the bureau has become involved in rail transportation improvements.

Energy conservation continues to have a high priority within the bureau. Measures to improve traffic flow not only increase the motorists' convenience, but also aid in reducing fuel consumption. One example of this is a department sponsored Right Turn On Red Bill that was enacted as Chapter 350 of the Acts of 1978. This bill permits motorists to make a right turn after stopping for a red signal at appropriately signed intersections. Pending legislation would allow a right turn on red everywhere except where signs prohibiting it are posted.

Another area of energy conservation is in highway lighting where efficient high-pressure sodium (HPS) units are being utilized. These lighting systems provide a 50% cost and energy savings over previously used mercury vapor designs. In addition, an innovative energy saving lighting design was prepared during this fiscal year for the Route 1 underpass at Salem Street in Lynnfield. This design utilizes low pressure sodium lighting which has the highest efficiency of any commercially available lamp. This lamp, which is about 30% more efficient than HPS, is especially suited to tunnel and underpass applications because of its low surface brightness and absence of glare. It is hoped that public acceptance of this lamp with its characteristically orange color will permit broader applications and greater cost and energy savings in the future.

A brief description of some of the Bureau of Traffic Operations' other programs and accomplishments follow.

LIGHT DENSITY RAIL LINES

During the 1979 fiscal year, work was completed on railroad rehabilitation projects covering four branch line tracks; three on Cape Cod and one on the Ware River Secondary. These tracks were in very poor condition and, as a result, they were threatened with abandonment by the railroads. The projects were part of the State Rail Plan and 90% of the $3.1 million reconstruction cost was federally funded. The bureau's Railroad and Highway Safety Unit provided the required engineering support.



New rubber grade crossing installed on Rte. 1, Peabody as part of a statewide railroad crossing upgrading program.

The primary purpose of these projects was to revitalize rail transportation on lightly used secondary tracks. The energy efficiency and environmental compatibility of rail transportation as well as industry's need for safe, dependable rail service were primary factors in the state's decision to keep the lines operational. Reconstruction of these lines represents a long term economic investment in the Massachusetts business community and it is hoped that increased rail use will result.

BOSTON CITYWIDE COMPUTER SYSTEM

During this fiscal year, the department, in cooperation with the city of Boston, decided to implement a citywide computer control traffic signal system. This system will control approximately 360 signalized intersections initially, with expansion capability to 390.

SIGNAL UPDATING PROGRAM

During this fiscal year the Signal Unit advertised and awarded $550,000.00 worth of signal improvements under the State Signal Updating Program for conformance to the "Manual on Uniform Traffic Control Devices." The projects covered 26 locations: 17 municipal and 9 state locations. All state locations were designed by department personnel, whereas municipal locations were designed by department personnel, city/

town personnel, or by the city/town's consultant. All designs were reviewed and expedited by the department's Signal Unit.

A good start has been made toward the goal of compliance with the MUTCD for all state and municipally owned traffic signals.

RAILROAD GRADE CROSSING IMPROVEMENT PROGRAM

Under this on-going program, improvements were made to over twenty grade crossings during the past fiscal year. Improved crossing surface materials, such as concrete or rubber, provide a longer lasting and smoother grade crossing. In addition, the program provides for the installation of signals and gate arms at crossings in need of these safety improvements.

GOVERNOR'S HIGHWAY SAFETY BUREAU

The Highway Safety Unit administers a program in cooperation with the Governor's Highway Safety Bureau by which municipalities and the department receive funds for various activities and safety related equipment.

Several cities and towns receive traffic counters, pavement stripers, and sign fabrication equipment. The department received impact attenuator parts for high hazard locations.

One aspect of this program involves training courses for state, city and town employees. A total of 21 people attended engineer training courses during the year. In addition, the Bureau of Traffic Operations organized four one day seminars dealing with legal aspects and liabilities of traffic engineering. The seminars were open to representatives from cities and towns as well as DPW personnel. Two hundred and thirty people (155 local and 75 DPW) attended. The seminars provided a much needed opportunity for city, town and state personnel to become better informed of their agency's liabilities and legal responsibilities with regard to traffic engineering.



Traffic signal updating project — Rte. 152 at Rte. 106, Plainville.

SPEED MONITORING PROGRAM

55 MPH Speed Monitoring Reports are submitted quarterly to the Federal Highway Administration for annual certification of speed limit enforcement. In a significant change from the monitoring procedures used in fiscal year 1978, new federal legislation now requires that the percent exceeding 55 mph reported shall be based on a representative sample of all vehicles as opposed to the "free-flow vehicle" concept which has been the basis of speed monitoring to date.

ACCIDENT RECORDS SYSTEM

The Bureau of Traffic Operations now maintains an expanded accident record system. The computerized system stores accident data for all city, town and state roadways. This versatile system allows accident data to be retrieved for any town roadway, or intersection for at least a five year period. One use for this data is assigning priorities for improvement projects at high accident locations. Also, analysis of data at a particular location frequently gives a design engineer a basis to determine what type of improvements should be made.

Procedures and Records Section

The P&R Section is responsible for the continuous, comprehensive and systematic review of the records, policies and procedures relative to the technical operations performed by organizations reporting to the chief engineer.

MAJOR ACTIVITIES

A. Project Reviews

(1) *Construction Reviews* — Engineering teams from this section conducted approximately 96 in-depth reviews of active highway and bridge construction projects throughout the state. The review consists of a circumspect inspection and audit of all records relating to documentation for pay quantities and control of materials and equipment incorporated into the project to assure compliance with specifications and department and federal requirements. This phase is followed by a field inspection of work completed and in progress to assure that accepted practices and controls are being maintained by the contactor and state personnel. The contractor's overall compliance with Occupational Safety and Health Act (OSHA) requirements are evaluated together with measures taken to provide protection to the traveling public.

(2) *EEO Reviews* — Equal Employment Opportunity contract provision compliance is monitored through the procedures and records engineer. This review procedure, like that of the construction reviews, is implemented throughout the duration of each construction project, and specifically included:

a) 36 On-Site EEO Project Compliance Reviews;
b) 25 Joint FHWA Project Compliance Reviews;
c) 4 Home Office Compliance Reviews;
d) 33 Preconstruction Conferences;
e) 5 Post Preconstruction Conferences;
f) Compliance Reviews of Supportive Services Contracts.

Detailed reports of these reviews are prepared together with any recommendations and submitted directly to the chief engineer, with copies distributed to Research & Materials (construction review only), the Construction Office, respective district, and to the Division Office of the Federal Highway Administration.

In addition to review of all facets of the project relating to construction, the format for the project review report includes EEO project compliance with particular emphasis placed on compliance with required record-keeping, report submissions and includes an in-depth progress summation of the status of on-the-job trainees for those projects containing this special provision as part of the contract. An additional copy of each report is distributed to the section's EEO Unit to keep it informed of the overall compliance pattern and advised of any potential problem areas.

B. External EEO Affirmative Active Programs

(1) *Massachusetts Affirmative Action Program* is contained in all contracts in Boston and those projects outside of Boston with a dollar value in excess of $50,000. Presently, over 200 projects contain this program (stipulates a percentage of minority manhours per classification ranging from 5% to 30%). This is the only state whose highway contracts contain a general statewide affirmative action program.

(2) *Special Provision for Participation by Minority Contractors* — The department has instituted (with FHWA concurrence) a selective program to set aside a certain percentage of a contract dollar value (2% to 4%) for minority contractor participation. Presently, there are 18 active projects in this category with 8 completed. Also, for the smaller minority contractor participation ($10,000 to $100,000), we will let approximately 11 set aside projects. Four of this group are presently under contract. In addition, the department has selected approximately 40 projects for minority subcontract participation.

(3) *Private Survey Party EEO Provision* — The new EEO special provisions are included in all private survey party contracts. Massachusetts is the only state with EEO provisions in private survey party contracts.

(4) *Minority Contractor Prequalification* — To date, a total of four minority contractors are prequalified to bid on, and perform work valued in excess of $50,000.00.

(5) *Supportive Services Contractor/Consultants* — Presently under contract are three minority-oriented organizations located in New Bedford, Lawrence and Boston who are employed as consultants to provide supportive services to on-the-job trainees working in the consultant's respective geographical area. These services relate to recruitment, development of good work habits, counseling, follow-up, etc. In addition, a new contract was effected to employ a consultant to furnish supportive services to established and/or potential minority contractors and subcontractors, and promote increased participation of minority business enterprises in federal aid highway construction programs. One hundred percent federal reimbursment

Continued on page 30









Pictures of Mass. DPW's Affirmative Action Program for Women in Construction.





is received for all these direct supportive services contracts.

C. Standard Operating Procedures

The section completed its assignment of coordinating the updating of the department's standard operating procedures, as directed by the chief engineer, for all bureaus, divisions, districts and sections. The SOP manual was instituted in 1967 and had not been reviewed nor updated in its entirety since that time.

The section continues to review all proposed new or revised standard operating procedures concerning engineering or technical operations of the department. Where necessary, investigations are conducted to provide clarification of procedures or enunciation of policy.

SPECIAL ASSIGNMENTS

In several areas, this section is involved on a continuous basis for special assignments:

A. *Construction Seminars* — The procedures and records engineer and other section personnel participated in the annual meetings with field personnel in each of the districts throughout the state.

B. *Construction Safety* — OSHA regulations are prominently featured in construction project reviews. In addition, the section maintains close liaison with the Division of Industrial Safety, Massachusetts Department of Labor and Industries. Section personnel are available for investigative assignments by the chief engineer to resolve problem areas.

LIAISON WITH OUTSIDE AGENCIES

A. *Federal Highway Administration* — In addition to formal contact with the FHWA division and regional offices, personnel of this section have continued to participate in seminars and workshops conducted at regional and national levels.

B. *AASHTO & NASHTO* — The procedures and records engineer has been an active delegate to these organizations of state highway officials. Over the past year, preparations were completed for Massachusetts serving as host state for the 55th annual meeting of NASHTO (North Atlantic States Highway and Transportation Officials) which was held in Hyannis on April 24, 25 and 26, 1979.

C. *Other States* — Acting as liaison for the chief engineer and commissioner, this section has prepared replies to general and specific inquiries from sister states, particularly in the area of EEO.

D. *Other Departments/Agencies* — Via meetings with correspondence, the section has maintained close liaison with the Massachusetts Commission Against Discrimination, Department of Labor & Industry, Department of Commerce & Development, Massachusetts Turnpike Authority, Metropolitan District Commission and the Executive Office of Administration and Finance.

E. *Contractor Organizations* — A productive relationship of mutual benefit continues with CIM (Construction Industries of Massachusetts) and AGC (Associated General Contractors).

F. *Unions* — The cordial relationship with highway industry trade unions, through meetings and correspondence, continues relative to EEO.

G. *Minority Organizations* — Civil Rights and EEO duties have involved the section with minority organizations throughout the commonwealth. The productive relationships established have proven to be beneficial to all parties of our contracts.

Research & Materials Section

The Research and Materials Section has its headquarters in Wellesley and is responsible for a wide variety of physical research projects and for complex materials testing.

One of the section's major components is the laboratory. For testing and detailed analysis purposes, this is divided into four units, as noted:

1. Bituminous testing: quality control of asphalt and bituminous concrete mixes and testing and evaluation of new products.
2. Chemical: paint, chlorides, pesticides, adhesives and many other products are analyzed.
3. Concrete: portland cement and concrete are tested, as well as reinforcing steel, brick, pipe and fencing materials.
4. Soils: earth materials, gravel, sand, peat, loam, etc. are analyzed.

The Field Materials Control Unit has the responsibility for the monitoring of the plants which manufacture products used in highway building. There are more than two hundred bituminous concrete and cement concrete plants in the state which, at one time or another, service department projects. Their manufacturing equipment, techniques and controls must be approved by this unit.

All other manufacturing plants, such as steel, prestressed concrete, pipe, catch basin and manhole block companies must also be inspected and their products approved on a regular basis.

In addition to its plant monitoring, this unit is responsible for all progress record sampling on construction projects (245 of them in 1979), and is also charged with detailed review of materials documentation on these projects.

The Soils and Foundation Unit continues to provide expert consulting services on geotechnical matters, manages the department boring crew, and supervises all boring contracts. This unit also performs all engineering property testing of soils.

Among the various active research studies are "Surface Characteristics of Pavements" involving skid testing and a study in cooperation with the U.S. Geological Survey related to pollution control. The University of Lowell is assisting the department with its study of frost susceptible soils.



Research and Material personnel examining samples of concrete block, fencing and pipe which have arrived for analysis.

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Data Processing Section



Data Processing personnel demonstrating equipment for a visitor from Czechoslovakia.

CURRENT OPERATION

The Data Processing Section continues to provide service to all sections of the department including the eight district offices. The computer is in operation two shifts daily, five days per week and processes about 7000 jobs per month. The operation is in a multiprogramming environment, that is, the computer processes several jobs simultaneously. The major portion of the workload is for transportation planning, with the remainder equally divided between engineering and administrative service applications.

Transportation planning applications range from road inventory and traffic counting to the simulation of transportation networks and traffic assignment. Engineering applications are a reflection of the department's own diversity, satisfying the needs of almost every section: Geodetic, Prelims, Environmental, Design, Bridge, Layouts, Specifications, Traffic, Construction, Finals, Maintenance and State Aid. The status of almost every project is tracked and recorded in computer files. The administrative services workload includes a variety of systems for payroll, cost accounting, budget control and personnel applications.

The computerized payroll system, one of our most appreciated efforts, is becoming increasingly more difficult to process. This is due largely to the fragmentation of the rate structure by the requirements imposed by collective bargaining agreements. Each employee has to be identified by either management, confidential or a collective bargaining unit as well as class code in order to establish his or her pay rate. With the collective bargaining agreements being ratified at different times and with varying compensation schedules for each unit, it is a major analytical procedure to correctly adjust each employee's pay rate. This is further complicated by management pay rate schedules and the natural process of employees changing positions. Naturally, detail records of all this must be retained for retroactive compensation. In spite of these difficulties, the weekly payroll calculations are processed through the computer on schedule.

PLANNED FOR THE FUTURE

Perhaps the most significant technological advancements in the data processing industry over the last several years has been in the area of remote computer processing via telephone communications. The department is committed to making use of some of this new teleprocessing technology. First generation teleprocessing terminals have been used by each district office for the last eight years. It is now planned to improve and expand this network by replacing the existing terminals with screen display type units and by adding several new screen display terminal locations. This will provide the computer "end user" with a more efficient and flexible data input device as well as a "picture" of data output and the option of a printed output.

The Data Processing Section staff has undertaken extensive technical training to implement the screen display terminals which require a more advanced system control program than is currently in use to monitor and direct computer operations. Education and training in the actual use of the new terminal equipment is also planned for the data processing staff. In-house classes in the new techniques will be given to other employees who will be using these terminals.

The intent is that eventually each section in the department will have the ability to interrogate its computer data files through a teleprocessing terminal, thereby making that information a more valuable asset.


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